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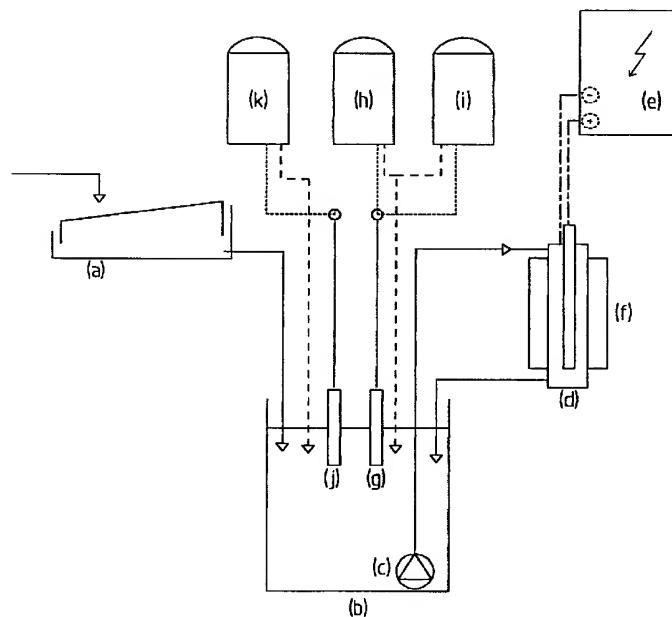
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(54) Title: ELECTROCHEMICAL METHOD FOR WET OXIDATION-STERILIZATION OF LIQUID WASTE FROM FISH SLAUGHTERING



**WO 03/031345 A1**

(57) Abstract: Electrochemical method for wet oxidation-sterilization of liquid wastes from fish slaughter where the pass of wastewaters is controlled by grid, controlled voltage and intensity of electric direct current, controlled conciseness of sodium chloride in the wastewaters, controlled temperature of the liquids wastes during electrolysis, controlled value of pH during electrolysis and elimination of residual oxidants with sodium sulfite or sulfur dioxide, I achieve the total elimination of all pathogens and in the same time reduce of the BOD<sub>5</sub>, COD, Color and TSS in such a limits as by the law.

# ELECTROCHEMICAL METHOD FOR WET OXIDATION-STERILIZATION OF LIQUID WASTE FROM FISH SLAUGHTERING

## 5 TECHNICAL FIELD

The invention refers to the electrochemical method for wet oxidation-sterilization of the liquid wastes from fish slaughtering.

## 10 LEVEL OF CONVECTIONAL TECHNOLOGY

Up to now the disposal of liquid waste from fish slaughtering is achieved with biological treatment. The efficiency of such a process depend on the sudden increase or decrease of the organic load in the waste, it is vulnerable to weather conditions, the result of the process is not steady and rarely with in the law, the disinfection that is completed in the last stage do not have the power to eliminate all the pathogen and creates during it's operation mud which is a huge environmental problem. The running cost of such a process is high.

## 20 ADVANTAGES OF THE INVENTION

The method, due to the production of powerful oxidants during electrolysis, such as  $O_2$ ,  $Cl_2$ ,  $ClO_2$ ,  $O_3$ ,  $O_2$ ,  $H_2O_2$ ,  $[OH]$ ,  $[CLOH]$   $[O]$  successfully oxidize all organics in the waste mass, no mud is created, it does not depend on any outer effects such as climate conditions and the running cost is noticeably lower than a biological treatment.

## DESCRIPTION

30 The liquid waste from fish slaughtering activity is created from the slaughtering department, the blood drainage department and from the disinfection procedure of the areas.

35 The invention refers to the wet oxidation – sterilization of the wastes from fish slaughtering by electrolysis where the conciseness of the liquid waste and sodium chloride is between 0,5% and 5% in weight/weight, the voltage of direct electric current is between 6V and 48V and the intensity of the direct electric current is between 50Amp and 500Amp. The temperature during electrolysis is between 14°C and 60°C and the pH value between 2 and 9,5 points. For better results of oxidation-sterilization of the wastes, before they enter the electrolytic cell or the tank where the cell is, they passed from a fine grid, type screen or cylinder, spaced between 1mm to 0,01mm. The neutralization of the

residual oxidants is accessed by sodium sulfite, or sulfur dioxide assisted by redox meter.

#### EXAMPLE 1 (drawing 1)

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50 liters of waste from fish slaughtering conciseness of 2% in sodium chloride are guided to screen (a) type cylinder with spacers 0,29mm to subtract any solid. The total volume is entering to the tank (b) 100lit capacity where a submersible pump (c) of re circulation 15m<sup>3</sup>/h driven this to the electrolytic cell (d). Noble and strategic metals make the anode of the cell and stainless steel 316L the cathode. The cell (d), is powered by a DC transformer (e), with controlled voltage 0,5V to 48V and controlled intensity 0,5Amp to 500Amp. The waste water entering the cell (d) and re-circulated by the pump (c) is electrolyzed with a voltage 16V and an intensity of 100Amps for 60 minutes. The system has a thermal exchanging device (f), which keeps temperature below 60°C and especially to 30°C. The pH is maintained between 2 and 9,5 points and specially to 8,5 points by the support of a pH meter (g), which upon request adds oxide or base to the process from the tanks (h) or (i). At the end of electrolysis, assisted by redox meter (j), the wastes are neutralized from the residual oxidants by addition of sulfur dioxide from tank (k).

#### EXAMPLE 2 (drawing 2)

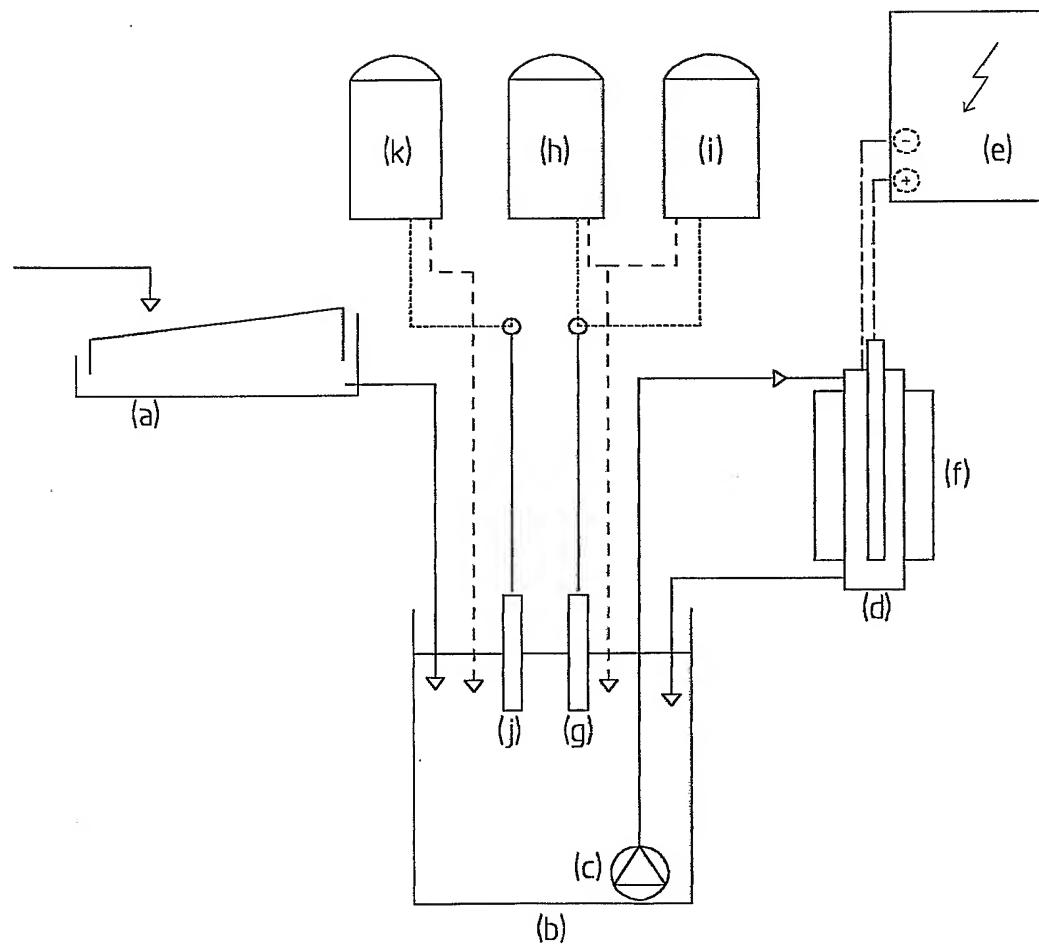
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50 liters of waste from fish slaughtering conciseness of 2% in sodium chloride are guided to screen (a) type cylinder with spacers 0,29mm to subtract any solid passing towards tank (b) of 100lit capacity. In tank (b) there is an electrolytic cell (c) witch noble and strategic metals make the anode of the cell and stainless steel 316L the cathode. The cell (c) is powered by a DC transformer (d), with controlled voltage 0,5V to 48V and controlled intensity 0,5Amp to 500Amp. The liquid waste in tank (b) is electrolyzed for 60 minutes with a voltage 16V and an intensity of 100Amps. Through pH meter (f), I fix the value between 2 and 9,5 and especially to 4 points by addition of hydrochloric acid from tank (g). At the end of electrolysis, assisted by redox meter (j), the wastes are neutralized from the residual oxidants by addition of sulfur dioxide from tank (k)

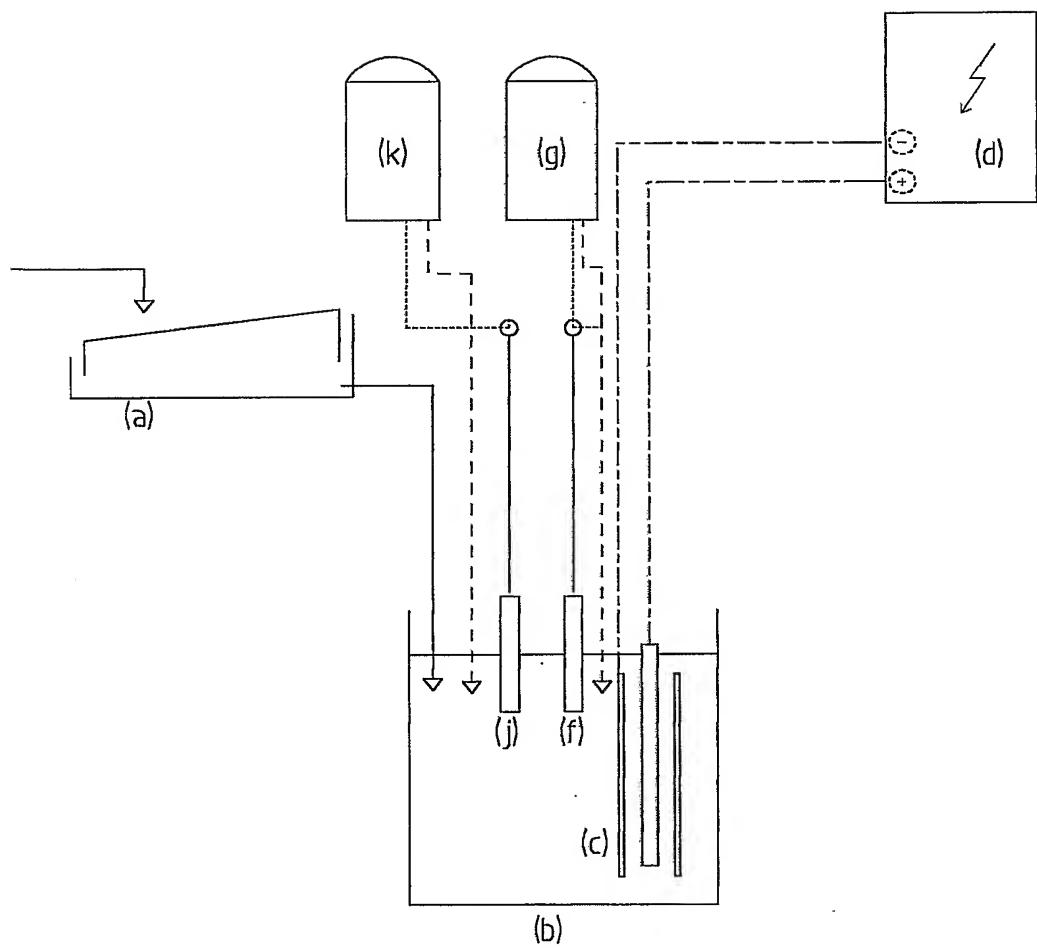
## CLAIMS

- 1.Electrochemical method for wet oxidation – sterilization of liquid wastes from fish slaughtering, with controlled screen, controlled voltage and intensity direct electric current, controlled solution of sodium chloride in the waste, controlled temperature of liquid wastes during electrolysis, controlled value of pH during electrolysis and neutralizing residual oxidants by addition of sulfur dioxide, or sodium sulfite.
- 5 2.Electrochemical method for wet oxidation – sterilization of liquid wastes from fish slaughtering as claim 1 where the screen is made by a grid or cylinder with spacers between 1mm to 0,01mm.
- 10 3.Electrochemical method for wet oxidation – sterilization of liquid wastes from fish slaughtering as claim 1 where the voltage of the direct electric current is between 6V and 48V.
- 15 4.Electrochemical method for wet oxidation – sterilization of liquid wastes from fish slaughtering as claim 1 where the intensity of direct electric current is between 50Amp and 500Amp.
- 20 5.Electrochemical method for wet oxidation – sterilization of liquid wastes from fish slaughtering as claim 1 where the conciseness of sodium chloride is between 0,5 to 5% by weight/weight.
- 25 6.Electrochemical method for wet oxidation – sterilization of liquid wastes from fish slaughtering as claim 1 where the temperature, during electrolysis is between 14°C to 60°C.
- 30 7.Electrochemical method for wet oxidation – sterilization of liquid wastes from fish slaughtering as claim 1 where the pH value is between 2 and 9,5.
- 35 8.Electrochemical method for wet oxidation – sterilization of liquid wastes from fish slaughtering as claim 1 where the neutralization of residual oxidants is done by sodium sulfide.
- 40 9.Electrochemical method for wet oxidation – sterilization of liquid wastes from fish slaughtering as claim 1 where the neutralization of residual oxidants is done by sulfur dioxide.

## DRAWING 1



## DRAWING 2



## INTERNATIONAL SEARCH REPORT

International Application No
PCT/GR 02/00053

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C02F1/467 C02F1/461

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
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Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C02F A61L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT
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Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X	EP 1 074 515 A (STERILOX MEDICAL EUROP LTD) 7 February 2001 (2001-02-07) column 4, line 30 -column 6, line 8 column 23, line 35 -column 28, line 29 --- -/-	1

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Patent family members are listed in annex.

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